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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/555,890	11/07/2005	Yuichiro Yamushita	03500.109247.	2695
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EXAMINER				
FOSSELMAN, JOEL W				
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/555,890

Applicant(s)

YAMASHITA, YUICHIRO

Examiner

JOEL FOSSELMAN

Art Unit

2622

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 March 2009.
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4 and 6-11 is/are pending in the application.
4a) Of the above claim(s) 5 and 12-20 is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1,2 and 6-11 is/are rejected.
7) ☒ Claim(s) 3 and 4 is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on 07 November 2005 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

Applicant's election of claims directed to Species I without traverse, in the reply filed on 02/27/09 is acknowledged. Claims 1-4,6-11 are currently pending. Claims 5,12-20 have been withdrawn from consideration.

Specification

The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

Drawings

Figures 22-24 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

Claim 1 is objected to because of the following informalities: with regards to "the reference signal", in line 13, it is unclear as to which signal applicant is referring, since two signals are previously disclosed and neither signal is explicitly defined as "the reference signal". Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1,2,6,7,9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fossum et al. (US Patent 5,880,691, hereinafter Fossum) in view of Furukawa et al. (US Patent 4,110,746, hereinafter Furukawa).

Re claim 1, Fossum discloses, an image pickup device having sensing elements arranged in a matrix (fig 5 IR readout), and an A/D converter provided for each column of said sensing elements (fig 5 reference character 46, col 6 lines 19-26). Fossum fails to explicitly disclose the device characterized in that said A/D converter first retains in its memory unit as an initial value an electric signal corresponding to a signal of said sensing element which is an analog signal, and said A/D converter then initiates charge or discharge of said memory unit at a rate corresponding to the size of input fixed signal, measures a time period from either the charge start time or the discharge start

time until the electric signal of said memory unit becomes equal to the reference signal and recognizes the measured time period as a digital value.

Furukawa discloses an A/D converter characterized in that said A/D converter first retains in its memory unit as an initial value an electric signal corresponding to a signal of said sensing element which is an analog signal (Fig 2 reference character Eo, col 2 lines 65-67), and said A/D converter then initiates charge or discharge of said memory unit at a rate corresponding to the size of input fixed signal (col 3 lines 23-26, col 4 lines 42-50, reference character T2), measures a time period from either the charge start time or the discharge start time until the electric signal of said memory unit becomes equal to the reference signal and recognizes the measured time period as a digital value (Abstract, col 2 lines 8-20). Furukawa further discloses the invention is also applicable to the cases of other transducers producing outputs of nonlinear characteristics or the case of an A-D conversion of an output from a converter (col 12 lines 23-28). It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate a transducer such as a photosensor in place of a thermocouple unit in order to sense incident light for capturing an image.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate an image pickup system with A/D converters on each column, as claimed, to reduce the amount of converting done by a single converter; meanwhile measuring the time period from start of discharge to finish and recognizing that time as a digital value. Since Fossum discloses an image sensing structure having A/D converters provided for every column of the readout; substituting

the A/D converter, from Furukawa, would create an image pickup device with an A/D conversion system that is inexpensive but highly accurate.

Re claim 2, the combination of Fossum and Furukawa discloses the image pickup device of claim 1, characterized in that said A/D converter comprises an integrator (Furukawa reference character 4), and said initial value is determined by integrating for a certain period of time said sensing element's signal with said integrator (Furukawa col 2 lines 8-11), and the determined said initial value is either charged or discharged using said integrator (Furukawa col 2 lines 11-17, by applying a voltage with a opposite polarity the device is essentially discharging the initial charge at a given rate).

Re claim 6, the combination of Fossum and Furukawa discloses the image pickup device according to claim 2, characterized in that said memory unit is an output portion of said integrator (Furukawa fig 1, the voltage measured by the integrator is output and converted to a digital value, see Abstract, col 2 lines 8-22).

Re claim 7, the combination of Fossum and Furukawa discloses the image pickup device according to claim 1, characterized in that said sensing elements arranged in a column direction are selectively connected to a vertical output line (Fossum discloses a CMOS sensor and CMOS sensors are selectively output via a sensing line), and said vertical output line and said A/D converter are connected via a voltage amplifier (Furukawa reference character 2).

Re claim 9, the combination of Fossum and Furukawa discloses the image pickup device according to claim 1, characterized in that the reading of a row is

commenced prior to the conclusion of the output of a signal of another row after sensing from the A/D converter (Fossum discloses a CMOS sensor which inherently can be read selectively as desired). In view of the combination of Fossum and Furukawa, one skilled in the art would not have been precluded from reading a row prior to the conclusion of the output of another row. The readout sequence would have been obvious dictated by design choice.

Claims 8 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fossum in view of Furukawa further in view of Dhuse et al. (US Patent 6,133,862, hereinafter Dhuse).

Re claim 8, the combination of Fossum and Furukawa discloses the limitations of claim 1 including said sensing elements arranged in a column direction are selectively connected to a vertical output line. The combination fails to explicitly disclose that said vertical output line and said A/D converter is connected via a noise reduction circuit, and said noise reduction circuit has a function to reduce the noise signal of said sensing element from the signal after sensing.

Dhuse discloses an apparatus for reducing row reset noise in photodiode based complementary metal oxide (CMOS) sensors (Abstract). Figure 5 illustrates the column outputs are connected to the A/D converters via a CDS, which is used to reduce the noise of the sensed signal. Dhuse further discloses the outputs of set of CDS units 512 is sent to an analog-to-digital (A/D) unit 524, which converts the analog signals from

each of the set of CDS units 512 to a digital value. Thus, each of the sampled and reset values are converted from an analog signal to a digital value (col 3 lines 60-67).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate an image pickup device, as claimed, to sense incident light and convert the analog signal to a digital signal; meanwhile reducing the noise within the sensed signal before converting the analog signal to a digital signal. Since the combination of Fossum and Furukawa discloses an image sensing structure having A/D converters provided for every column of the readout; providing a CDS between the sensor and the A/D converter, from Dhuse, would reduce the noise in the signal essentially increasing the quality of the captured image.

Re claim 10, the combination of Fossum and Furukawa and Dhuse discloses an image pickup system comprising an image pickup device according to claim 1, an optical system which focuses light to said image pickup device (Dhuse reference character 104), and a signal processing circuit which processes an output signal from said image pickup device (Dhuse reference character 110).

Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fossum in view of Furukawa further in view of Huebner et al. (US Patent 4,688,017, hereinafter Huebner).

Claim 11 recites essentially the same scope as claim 1 and is disclosed by the combination of Fossum and Furukawa except for the image pickup device that initiates charge or discharge of said memory unit by a subsequently input second fixed signal,

measures a time period for an electric signal exceeding said reference signal of said memory unit after measurement becomes equal to said reference signal, and recognizes the measured time period as a digital signal.

Huebner discloses an optical detector circuit for providing high precision, low cost A/D conversion. A sampled signal is integrated in a sample signal integrator while a reference signal integrator is integrated in a reference signal integrator. Using dual slope techniques, the integrated reference signal is provided as an input signal to the sample signal integrator during a de-integration cycle to provide a ratio of the detected signal to the reference signal, useful in nephelometers. An inverted blanking signal may also be integrated in the sample integrator prior to an integration of the sample signal to improve the accuracy of the dual slope integration (Abstract, see also col 2 lines 5-32).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate an image pickup device, as claimed, to sense incident light and convert the analog signal to a digital signal; meanwhile providing a second fixed signal as a signal to discharge and measure the time period as a digital signal. Since the combination of Fossum and Furukawa discloses an image sensing structure having A/D converters provided for every column of the readout; providing a second fixed or true signal to be measured, from Huebner, would create a high precision and low cost A/D converter. The measured time period of the discharged signal, from Furukawa, would still render the digital value of said signal.

Allowable Subject Matter

Claims 3 and 4 are objected to as being dependent upon a rejection base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: The prior art of record fail to anticipate or render obvious the following limitations as claimed:

In view of claim 1 in its entirety, the further limitations of "...an output of said comparator is connected to a loading trigger terminal of said digital memory, said digital counter is connected to an input terminal of said digital memory and said digital counter output to be stored in said digital memory is the digital value." as recited in claim 3 are neither anticipated nor rendered obvious by the prior.

Claim 4 is dependent upon claim 3.

Contact

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOEL FOSSELMAN whose telephone number is (571)270-3728. The examiner can normally be reached on 9:00 AM - 6:00 PM M-F, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on (571) 272-3022. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Joel Fosselman/
Examiner, Art Unit 2622

/Jason Chan/
Supervisory Patent Examiner, Art Unit 2622